THE AGRICULTURAL RESOURCES OF THE ARABIAN PENINSULA

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Arabia's people, far from being exclusively the desert raiders who have influenced the popular conception of Arabia out of all proportion to their national importance, are a people primarily pastoral, who now have reason to believe that the productive capacities of their countries can be exploited to a greater degree than at any period in their recent history. With the discovery of the Persian Gulf oil deposits, forward-looking Arabians in the last generation have swung tentatively away from the insularism of centuries past toward a recognition that the economic rehabilitation of their countries may be soonest accomplished by the adoption of modern methods.

A chronic shortage of food for the majority of the people has been a primary limitation to internal development. If anticipated receipts from the oil fields and refineries of the coastlands continue to materialize, if a share of the revenues accruing can be allocated for the development of agricultural resources, if old, as well as new, acres can thus be reclaimed, significant advances toward self-sufficiency in foodstuffs can conceivably be brought about in time, even though general acceptance of modern techniques may be slow and reluctant.

Arabian agriculture is handicapped by intense heat, capricious rainfall, and a perpetual scarcity of groundwater over most of the peninsula. Less than a quarter of the total land area, nearly 900,000 square miles, is naturally suitable for the growing of crops.

The saline littorals bordering the peninsula on three sides are infertile, except for scattered tracts on the southern Red Sea coast in the Yemen, and in the Bātinah district on the Gulf of Oman, and at Hufuf in Al Hasa Province of Saudi Arabia, to the northeast. The mountains extending the length of the western littoral and across the peninsula's southwest coast are, for the most part, rocky and barren between Aqaba and Mecca, but beginning in southern Asir Province into Yemen are well terraced for cultivation.

Beyond the coastal ranges, on the Red Sea side, desert-steppes in the north, and a ridged sandstone plateau from Yemen to As Sudair, stretch eastward for distances of from 100 to 350 miles. Vast areas of dune-sand desert, without vegetation, and an escarpment region, dominated by the Tuwaiq mountain range, flank the semi-circle. Except for meager growths of coarse grass and bushes, the plateaus, escarpments and the desert-steppes are barren, with few natural water-holes.

In summer, daytime temperatures on most of the peninsula range from 100 to 120 degrees in coastal areas to 130 degrees in the drier interior. Nights are comparatively cooler. Except for occasional snowfalls in the extreme north, and near freezing temperatures in the mountains of Yemen and the southern coasts, winter is mild over most of the land. The western ridge and plateaus have night frost, but it is unknown on the coastal plains.

Rainfall is scant and uncertain. Northern areas usually get a few inches of rain annually in winter, but periods of drought have lasted as long as three years. A fair amount of rain is brought by the monsoons to the Asir district in summer, and to the Yemen and Southwest coast. Four or five inches fall each year on the Tuwaiq Mountains and the heights of Oman draw slight rainfalls, but much of the plateau and steppe-land of the interior is almost as completely rainless as are the deserts.

Arabia has no perennial rivers; there are, instead, series of water-courses, called wadis, descending on either side of the highlands of the west and south, and along the Gulf of Oman. The deeply-eroded beds of the wadis running toward the sea are almost dry during the winter months, but a few times each year where the highlands catch the monsoon in Yemen and Aden, and where rain penetrates the western watershed as far north as Mecca, floodwaters rush down to the coastal plain with such violence as to be lost for irrigation, since the surrounding soil is seldom permeated. Wadis running inland are of greater value in the economy of the land. Coming down more gradually from the water-parting at the top of the mountains, they unite to form a network extending far into the interior. Though in more arid regions the beds of the shallow, inflowing wadis may appear completely dry, sub-soil water can be reached by wells at most seasons of the year. Oases are found wherever waters converge near the surface, not only in sand deserts, but in the bare, stony hills. In the ravines near the foot of mountain ranges, date groves and cultivated fields are supported by the waters and silt deposits of springs flowing inland. These arable tracts with the loosely connected large oases of the Nejd, in the interior; those of Al Hasa and the Bātinah districts in the east; and the fertile valleys and slopes of Asir Province and the Yemen, are the agricultural centers of Arabia.

Saudi Arabia occupies the greatest part of the peninsula's area, but almost 65 percent of its nearly 600,000 square miles falls in the category of wasteland. Pasture and grazing lands account for more than 30 percent; relatively minor built-up areas, and the acreage that can be classified as cultivable make up the small remainder. Of the arable land, probably only three-quarters is actually under cultivation. The average Saudi Arab, and certainly the bedouin, is not by inclination a commercial farmer, and finds little encouragement in a natural limitations of the land to produce beyond subsistence level, if such is possible. With a population calculated at even the lowest estimate food production lags far behind an ideal consumption rate.

The economic means of an upper-class minority permits them to import food of all types, but many of the people, afflicted with plain, downright poverty, must depend upon the produce of their own land. Meat, principally mutton or lamb, poultry, grains, and a variety of dates, other fruits and vegetables are obtainable in the villages and towns according to the purchasing power of each family. In the standard Saudi diet, however, camel milk, sheep and goats' meat, and dates are the indispensable items, supplemented by grains as available, small amounts of game, and, in the coastal areas, fresh fish. Dried fish

for livestock feed is sent far into the interior, but is not generally favored for human food. Rice is popular, but its use is also regulated by the economic means of the buyer, since little is locally grown. Because of the relatively high price of wheat flour, bread is frequently made of sorghum, barley or millet. Among bedouin families, a porridge of sesame seed flour, boiled with water, and fat from the tail of the fat-tailed Arabian sheep, or boiled grain-flour pastes are commonly substituted for a baked loaf. Meat from livestock does not constitute an essential dietary item to the bedouin; a live camel is considered to be more useful than one dead, and sheep, except for ceremonial occasions, too valuable to be slaughtered for food.

Livestock is the greatest source of agricultural wealth in Arabia, and its owners are considered far superior socially to the more settled folk who cultivate the land to live. Camels, providing transportation, milk and occasionally meat, are the most important animal in the country, although greatly out-numbered by sheep and goats. Arabian sources calculate the livestock population at roughly three and a half-million sheep, two million goats, 275,000 camels, 55,000 cattle, and half that many donkeys, but no comprehensive count has been made. The famous Arabian horses, few in number, are used for riding, and most infrequently as work animals.

Sheep provide most of the meat consumed, as well as ghee, or butter, and milk, but are equally valued as sources of revenue during the months of the annual pilgrimage to Mecca. Thousands are sold for sacrificial purposes each year. Only a few sheep are sheared for wool; practically no wool is exported. Goats, with camels, add to the milk supply, and furnish the goat hair used for desert tents, or, mixed with wool, for making rugs and carpets. Native cattle are used primarily as work animals. A few milk cows are found near cities where the foreign population is appreciable, but there are only two dairies in Arabia - those at the Government's experimental farms, Al Kharj and Dammam. As in most Middle Eastern countries, the donkey is an ever-present beast of burden, for those unable to afford the camel.

Of the agricultural crops, no other native culture furnishes more food per acre than the date. Except in the Tihama where grain sorghums predominate, as high as 90 percent of all cultivable land has been estimated as planted primarily to dates; in all but the highest altitudes, wherever the soil is at all suitable, nearly every village has its groves. Over seventy varieties are produced in the country, some of them superior in quality. The finest types are found at Medina and Bisha in the west, in the Al Kharj district of the Nejd, and at Hufuf oasis in Al Hasa.

In an average year, date production totals over 250,000 tons, most of which is eaten locally or used with ground date seeds, for livestock feed. Except for special varieties, such as the prized Al-Khilas from Hufuf oasis, only small quantities are sent out of the country. There is, in fact, usually an import balance several times greater than exports. In the last few years, the Saudi Government has begun to give special attention to the improvement and expansion of date cultivation and marketing, in the hope of raising nutritional standards while producing a surplus of fruit for the export market. Yanbu al Bahr, on the Red Sea coast, is an exporting center for the western regions, and the Saudi Arabian mercantile firms engaged in date exportation from the east are established on Bahrein.

The date palm itself contributes much to the national economy. Timber for building and fuel come from its trunks and leaves. Leaflets are woven into matting, and palm fibers are used for rope-making.

Grains rank next to dates in importance, with wheat, barley, sorghums and millet the main crops. The rate of production fluctuates from one year to another depending on the available water supply. Wheat was a major crop in the country prior to 1925, when imported rice was introduced at a much lower price to the public. With the restriction of shipping in World War II, however, the planting of wheat was resumed in small plots all over the land. Rice is now cultivated wherever the convergence of springs, as at the Hufuf oasis, makes possible the flooding of the rice fields.

Other crops are a Mocha variety coffee, grown in the Asir, garden vegetables, and fruits, of which figs, grapes, pomegranates and peaches are the most common. A few ordinary bananas, sour limes, rough and sweet lemons, and oranges are under production, as are small quantities of almonds and peanuts. The best known vegetables are red onions, potatoes, eggplant, okra, squash and tomatoes. Alfalfa and Bermuda grass are the feed crops most commonly grown.

Any attempt to determine the total and per capita food supply of the country must be based largely on conjecture. Although the Saudi Government is endeavoring to improve its statistical reporting, official estimates of agricultural area and production, seeding rates, and livestock numbers in the Kingdom now mainly depend on the accounts of nomads and on people of primitive communities who are unacquainted with modern statistical methods. Except for the Sharia alms, which are levied on only a specific quantity of crops or number of livestock, and may be arbitrarily rescinded from time to time, no government tax is imposed from which estimates might be accurately computed. The extent to which illicit border smuggling of food and animals may still prevail is unknown. As regards legitimate foreign trade, Saudi customs

authorities' present accounting system, also in a primary stage of development, cannot yet be expected to give complete coverage to the country's trade in foodstuffs. For these reasons, such agricultural data as are now supplied from official sources must be recognized as no more than approximations. From a recent effort made in bringing together a trial food balance - of necessity the sum of an evaluation of such official data as could be collected and independent estimates for non-recorded information - food apparently available for human consumption in the year 1950-51 was found to support only 3 million people at a daily intake of roughly 1,500 calories.

Most Saudi farms are close family projects, and few are larger than five acres in size. Alkaline salt deposits line the edges of the watercourses in many sections of the country; as new plots of land are planted, others are abandoned. Each grower saves his own seed, and, for the most part, knows nothing of cross-pollination or selection for type. Tools and cultivation methods are primitive. Ordinarily, plowing is done with a short-handled hoe, and a metal-tipped wooden plough pulled by bullocks. The Arab tends to over-plant and over-water his field; practises of thinning and spacing of crops, and water regulation are unknown, and commercial fertilizer is seldom used. Yields of wheat and barley run from five to ten bushels an acre. Yet, using modern production methods and equipment at Al Kharj, the Government-sponsored model farm in the Nejd, yields several times as high have been produced.

The Al Kharj project began in the late 'thirties when the Saudi Government, with the aid of Iraqi and Egyptian technicians, attempted, with only fair success, to develop long-unused water resources of the district to increase food production. United States interest in the farms evolved from an appeal by the Arabs for further assistance when the outbreak of World War II made the importation of food increasingly difficult. U. S. advisory and agricultural missions visited the country in 1942 and 1944. In 1945, with a labor crew of 1,300 Saudis, under American supervision, and a flock of hump-backed zebu bulls to augment the few tractors brought in by the mission for power, existing irrigation canals were extended, and work began on the first experimental planting.

Only persistance on the part of the Americans, bolstered by the determination of the late King, Ibn Saud, made any real progress possible. Fuel, machinery and supplies had to be trucked in from the oil camp at Dhahran, 275 miles across the desert. Just as the first crops were sown, flash flood waters from the Tuwaiq foothills struck Al Kharj, destroying most of the new irrigation canals. Second crops of wheat, alfalfa and vegetables were wiped out by an invasion of locusts spreading over the developed land. Labor problems arose, sparked by religious factions to whom Christian interference was anathema. Those laborers employed were at first slow to adjust to Western farming methods. Many months passed before they could become

accustomed to the handling of unfamiliar tools and machinery. Not until after the first successful crops were harvested, with their yields remarkably high for Arabian soil, could the Saudi student farmers be convinced of the desirability of using fertilizer, or regulating the use of water.

In 1946, however, after a favorable progress report by a third U. S. agricultural mission, the King felt justified in assuming the financing of the project, using oil royalties to expand the farms. Under the guidance of new American instructors, recruited by the Arabian-American Oil Company, almost five hundred miles of irrigation ditches, in addition to the main canals, and many miles of small dams for flood protection have been constructed. There are three model farms now operative, with over three thousand acres in cultivation. About half of the land is in grains, principally wheat, barley and maize. Alfalfa, Sudan grass and sugar cane are grown, as are numerous truck crops, fruits, and nursery stock of types both indigenous to the country and imported for trial. Date production at Al Kharj has increased tremendously with the use of new strains and growing methods developed by California date growers. Experiments are being made to introduce varieties of rice, potatoes, oilseeds and forage crops especially suited to the Arabian environment. Poultry raising and livestock breeding have come in for attention. One of the farms is a dairy farm stocked with American and some native cattle.

Although Al Kharj has surpassed expectations from a horticultural point of view, it stops short of the first announced goal - that of making more food available to all the Saudi people. The farms have never, in fact, become public distribution centers for foodstuffs, but have remained possessions of the King, whose family and official retainers have first claim on the farms produce. The pattern is repeated at another agricultural station at Dammam. Most Saudi officials are not yet oriented to the democratic principle of equitable distribution of the fruits of the undertaking beyond their own circles.

A second goal, that of assuring the proficiency of Saudi farmers in Western agricultural methods, has been achieved only in part. Most instructors feel that it will take much more training and practise before even the more advanced of the Saudi pupils is competent to deal independently with the complexities of modern farming.

No more than a start toward agricultural expansion has been made in Saudi Arabia. Even with unlimited financial support extensive social reforms, years of re-education and much cultural change must be effected before agricultural rehabilitation can benefit the population as a whole. For many years to come, while the transition is being made, Saudi Arabia will have to depend on her expanded purchasing power for imports to improve nutritional standards.

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Along the peninsula's northeastern coasts, in Kuwait, Saudi Arabia, Qater, and the Bahrein Islands, are found the newly discovered oil fields which have elevated the sheikhdoms of the Persian Gulf from impoverished states dependent on boatbuilding, pearl fishing, minor trade, smuggling, and piracy for existence, to positions of international significance.

From the standpoint of agriculture, however, these lands, with those of Trucial Oman to the south, are probably the worst in Arabia --- Saudi Arabia's "Empty Quarter", the Rub al-Khali desert, excepted. Areas not covered by sand dunes and rolling ridges are barren and rocky terrain broken by occasional salt mud flats, where the alkaline salt-sand crust left behind with the fast evaporation of water in temperatures averaging well over 100 degrees in summer is deep enough to permit salt mining in some sections.

There are no rivers, and rainfall averages only about five inches a year, or less than half the amount necessary to maintain permanent grass cover. Except where springs in the north of the largest of the Bahrein Islands make date cultivation possible, and where figs, dates, pomegranates and some vegetables can be grown on small oases near the end of the Trucial Coast, and in the foothills of the Jabal Ash Shām region, the only agricultural production is found in the home gardens of the cities.

Wherever the oil companies have operated, towns and villages have been modernized. Hospitals and schools have been built, good housing put up, harbors improved, roads paved, sewers installed, and, on Bahrein, where a third of the oil profits have been allocated to the improvement of the islands, attempts have been made to teach those who are interested in farming something of seed selection and proper utilization of such water as is available. Arabian employees of the oil companies have been able in some instances to purchase small date groves and livestock with their wages.

Lack of fresh water is the basic problem. Though many wells have been dug by the oil companies to provide water for industrial use and for livestock, and a distillation plant for fresh water has been built - with a second projected - in Kuwait, no plan to supply water in quantities sufficient for large-scale irrigation purposes is yet in operation. The diversion of water by canal or pipeline into Kuwait from the Shatt al-Arab River in southern Iraq has long been under discussion. Intended eventually to irrigate some 6,000 acres, in addition to supplying the fresh water of the Sheikhdom, the project would make possible cultivation of enough fruits and vegetables for local consumption, but no grain crop farming is anticipated in the near future.

As in pre-oil days, most food must be imported, with India, Iraq, Iran, the Netherlands, England and the United States the chief suppliers. Oil field employment has made it possible, however, for an appreciable percentage of the population to improve the quality and quantity of their purchases, except in Trucial Oman, where oil discoveries near Abu Dhabi are too recent to have yet made any beneficial impression on the Trucial Coast's depressingly low living standards. The economic prospects of the whole area are almost completely dependent on its petroleum development.

It is conversely true that the economy of the Sultanate of Muscat and Oman, lying just south of the oil countries between Saudi Arabia's southern desert and the Arabian Sea, will probably fail to develop to any considerable extent above the level it now maintains unless oil should be discovered. Fortunately, better soil conditions permit the growing of exportable quantities of dates, limes and pomegranates, which with the income from fish exports, plus a small British subsidy, helps to equalize a balance of trade that is chronically unfavorable, since most other foods, and all manufactured needs, must be imported.

The narrow strip of land occupied by the Sultanate is made up of a coastal plain running intermittently along the 800-mile coast line, flanked inland by plateaus of about 1,000 feet elevation, and a mountainous region southwest of Muscat which reaches 9,000 feet, or high enough to intercept the moisture-laden winds from the Indian Ocean, and cause precipitation in the Jabal Ash Shām area.

The Bāṭinah district, a 150-mile length of coastal plain on the Gulf of Oman, constitutes the richest agricultural area in the Sultanate. Although rainfall in the interior of the country averages less than four inches annually, enough falls in the Bāṭinah that, combined with water coming down from the western mountains, intensive cultivation of grains and fruit, and the raising of cattle and poultry are possible. Here are located some of the world's largest date groves.

There is sufficient grass near the Jabal Ash Shām area to permit widespread grazing for sheep and cattle, but little rain falls in the rest of the mountain regions, or on the plateaus. Farming inland is confined to small cultivated plots on oases, where subsistence crops of dates, limes, peaches, grapes, vegetables and a little grain can be raised.

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The Crown Colony of Aden, at the southwestern tip of Arabia, has no agriculture, no mineral resources except salt, and no other natural advantages than its two harbors, the best on the peninsula. The Port of Aden is a convenient bunkering point for ships in the east-west trade, but exists principally by collecting raw materials from neighboring countries for re-export, and importing the manufactured goods of industrial nations for distribution throughout the Red Sea area. Although entrepot trade has been hard-pressed by competition from the French port of Djibouti during the last year, and the proposed enlargement of Red Sea ports belonging to Yemen and Ethiopia, though still in planning stages, will undoubtedly weaken Aden's position when developed, it is anticipated that the five million ton, $125,000,000 Anglo-Iranian oil refinery at Little Aden, completed in mid-August of last year, will offset a serious drop in the income from other sources.

Volcanic rock and a sand shore make it virtually impossible to grow anything in the Colony. Except for an annual production of about 7,000 tons of dates, and some 3,000 tons of fish caught in local waters each year, all food, and feed for the Colony's 2-3,000 cattle and 10-12,000 sheep and goats must be imported.

Aden's two Protectorates - the Western, which lies north of the Colony, and the Eastern, which includes the valleys and plateaus of the Hadhramaut - furnish only a limited proportion of the Colony's food requirements. More than 60 percent of the Protectorates' 112,000 square mile area is in meadows and grazing lands, supporting a livestock population of about 850,000 goats, 200,000 sheep, 80,000 camels and 70,000 cattle. Livestock plays an important part in the Protectorates. Most of the transport is by camels and donkeys; with cattle, they provide power for lift irrigation from wells, and draught power in the fields. Goats and sheep are important as sources of meat, milk and skins.

Somewhat less than half of one percent of the Protectorates' total area is utilized for main food crops. The standards of dry land farming are high; opportunity for agricultural improvement would seem to lie in expansion of cultivable acreage by increased irrigation, and better regulation of such water facilities as exist.

Except in the extreme western part of the country, rainfall is insufficient, and its distribution irregular. Deep wadis intersect the land, which is partly mountainous, partly steppe-desert of mid-altitudes, and partly low coastal plain. The most fertile and productive soils are those of the wadi valleys of the coastal areas in the Western Protectorate, where an annual rainfall of only two inches is supplemented by a diversion system of irrigation, using water coming down the wadi beds from the hills to land prepared by the building of bunds. Local farming practices, however, principally

make use of only surface water, with limited control of permanent flow. Less than a quarter of the potentially cultivable acreage of the coasts is cropped even in good seasons.

In the better rainfall areas at higher altitudes inland, and in the mountains, intensive farming conditions result as the density of population increases. Elaborate systems of terracing are employed. Wherever the mountain slopes catch the rainfall, plots of land are hand-cultivated on small terraces. Lower down, the terraces are larger, and are irrigated either by a basin system, or by series of earthen dams built across the wadis in dry seasons to bank up the water, which is then allowed to stand on as wide an area as possible for about forty-eight hours before descending to the next dam below. In some parts, lift irrigation from draw wells, operated by animal power, is used in conjunction with flood irrigation.

Wādi beds are cultivated in the Hadhramaut, under irrigation partly by wells, and partly by run-off flood water controlled by dams. Like the rainfall, floods are subject to variation; thus, the area of crops grown on flood irrigation changes from season to season. On the average, such land may be successfully planted only once in two years.

Dates are the crop most commonly grown; along the Wadi Hadhramaut alone there are said to be as many as 1,600,000 trees. Sorghum and small millets are the main cereals, and where water facilities permit in the Eastern Protectorate, two crops of sorghum are sown each year, in March and August-September. As much wheat as possible is planted - in recent years nearly 6,000 acres - and numerous subsidiary crops, including barley, sesame, indigo, garden vegetables, fruits and tobacco are cultivated, with some coffee and ghat in better watered areas. Alfalfa for fodder is found on almost every farm plot.

In 1953-54, 8 million pounds of cotton were produced on 20,000 acres planted at the Abyan oases, east of the Colony. With the yield of some 2,000 acres in other sections, the total represented an increase of 100 percent over the preceding year. It is estimated that the output from the Abyan area will again double during the 1954-55 season.

Grains, dates, melons, bananas and other tropical fruits, and vegetables are sent into Aden Colony from Lahej oasis, situated between two wadis directly north of the Colony. In recent good years, fruits and vegetables grown in the hills of the Western Protectorate have also found a market in the Colony. Except for fish from the coastal areas, and minor exports of hides and skins, almost all production is consumed locally, or exchanged within the national economy.

The nutritional level in both Protectorates is extremely low. In one district or another, shortages of varying severity can be found at almost any time. Famine is not uncommon in the Hadhramaut, where in bad years the added pressure of a large non-farming population, which relies for support on income from Hadrami colonies in Southeast Asia, further strains an already precarious food supply for the whole community.

There are no railroads or inland waterways in the Protectorates; improvements in communication and transportation would greatly facilitate the distribution of such food as is available. A resettlement project, designed to shift farmers from the over-populated highlands to potentially arable lowlands, or reclaimed areas such as the Abyan development north of Aden Colony, would be desirable, though difficult of administration as long as the nineteen states of the Western and seven treaty areas of the Eastern Protectorate remain politically separate.

Some steps have been taken toward federation, however, and some progress has been made, under various development schemes of the British Colonial Office, in re-opening and modernizing old wells and dams, and building new ones. A limited number of irrigation pumps and some farm machinery has been introduced, and efforts have been made to include training in modern agricultural methods in local school curricula.

Though the Adenese native tends to look to the Colonial Government for almost paternal support, and is little disposed to improve living standards by his own efforts, those who have worked periodically in the cosmopolitan Port of Aden, by their contact with the traders of the world, are rendered perhaps less resistant than the more isolated Arab to change from primitive ideologies. The same is true of the Hadrami, who, having followed the tradition of hundreds of years in establishing his lucrative Asian mercantile colonies, and returning to the homeland, after twenty years or so, to retire on the profits, is more than ordinarily alert to the advantages of self-sufficiency. Competent direction and much more money is needed, however, to develop fully the country's land and water resources. There was no fresh water on Aden Peninsula when, supported by private funds of the Anglo-Iranian Oil Company, drilling commenced nearly two years ago. Water struck at 230 feet, eight miles away from the site of the new refinery now supplies half a million gallons daily to the refinery camp. A power station has been erected to service a town of 80,000 people, and machinery has been installed to pump in four million gallons of salt water an hour for industrial purposes. There are no public funds allocated for similar improvements in the Protectorates, but if, as many believe, there are oil deposits in the Hadhramaut and in the west, income from their exploitation should give real impetus to every modernization program, including those for the expansion of agriculture.

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Of all the Arabian states, only the Kingdom of Yemen is predominantly agricultural. Probably 90 percent of its four and a half million people are engaged in agriculture; nearly all of the present cultivable land is actually cultivated. Favored by a mild climate, fertile soil, and usually adequate rainfall, multiple harvests in the same year are possible.

Generally, farming is on small family plots, or on land worked by tenant-farmers for a share of the crop. Except for the royal family, there are few large landholders.

Yemenis are skillful at the construction of elaborately terraced fields, and relatively so in irrigating them for crops but still rely on antiquated production methods. Tools are primitive; there is no seed selection, and crop rotation is almost unknown. Sorghum, the main grain crop, is planted year after year in the greater part of southern Yemen.

About 65,000 tons of sorghum are grown in good years, which supplies domestic needs and provides an estimated 10-15,000 tons for export. Barley, corn and millet are cultivated in quantities sufficient for existence, but not quite enough wheat is grown to cover domestic consumption. Production of pulses, principally chickpeas, is more than adequate. A wide variety of excellent fruits and vegetables are grown - and locally consumed - in areas surrounding large towns. With the exception of raisins from the 23 varieties of grapes found in the San'ā region, practically none are exported. Bee-keeping is widespread; as many as 700,000 hives are said to be kept in the Kingdom.

Coffee, traditionally the best agricultural investment in the Yemen, is grown on the western highland slopes, but there has been a serious decline in both the quantity and quality of the crop in recent years. Since the early 'thirties, production - 4,000 tons in the last year of record - and exports have dropped more than 50 percent. The cultivation of ghat shrub, which flourishes under much the same conditions as coffee plants, has been substituted to a greater and greater extent as a more remunerative crop. Ghat leaves contain a mild narcotic commonly used by the Yemenis and are exported in considerable quantity to neighboring Arab countries.

Small plots of tobacco are planted for domestic use. Some 600 acres have been cultivated experimentally on government land, in the Western Tihama, with good results.

Grazing land for livestock is extensive in the Yemen. Sheep and goats predominate, but there is an abundance of camels and donkeys, and comparatively lesser numbers of small, humped, zebu-type cattle, and horses. A limited number of mules are imported from Africa, principally for government use. In San'ā about 200-300 sheep and goats are slaughtered daily, and some 20-30 cattle. Apparently from

neglect, the export trade in hides and skins has declined in much the same manner as has the coffee business. There are no official statistics on the foreign trade of the Yemen, but a reasonable estimate for the last few years would seem to be an annual export of from one to one and a half million skins (about 60 percent goatskins), and from ten to twenty thousand hides.

As the most nearly self-sufficient of the Arabian Peninsula countries, Yemen needs to import for food only sugar, rice, some wheat and flour, and such luxury items as spices, tea and dates. Aside from coffee and hides and skins to Western Europe, the United States and Saudi Arabia, however, she has to offer for export - principally to Aden - only ghat leaves, durra, very limited quantities of fruits and vegetables, and recently, salt from the Salif mines.

The Yemen has not yet had a share in oil profits. No attempt to investigate mining resources was made until about two years ago, when the native Yemeni xenophobia, stringent even for Arabia, was relaxed to the point that several teams of foreign geologists were invited to prospect the country. The first effect of this change of attitude was the re-exploitation of the old salt mines at Salif. Financial results of the venture have so far been disappointing. In the last few months, German geologists have undertaken investigations of coal and oil deposits but it should be noted that the American and British oil experts who previously visited the country for the same purpose were not hopeful, and showed no interest in acquiring prospecting rights. Unless future studies prove these experts wrong, it is to her unrealized agricultural and trade potentials that the Yemen must look for economic expansion.

One basic hindrance to agricultural development has been the insufficiency of the cultivated land in ratio to the supply of man-power. Appropriate extension of the cultivable area, and more intensive cultivation of the acreage now in use, would then demand modernization of production methods, and increased large-scale irrigation. Education in the selection of seed strains, in the use of fertilizers, and the means of combating plant diseases and pests would likewise be needed.

If these advances were made; if Yemeni roads - now little better than jeep-tracks, at best - were improved to permit free and speedy movement of goods within the country, her Red Sea ports at Ras Khetib and Mocha developed according to plan, and her recently restricted freedom of trade re-established, the country would be in a favorable position to supply considerable amounts of agricultural products to nearby areas, and so profit indirectly from the new oil-prosperity of the peninsula.

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Estimated Land Area and Population of the Arabian Peninsula, by Countries

Country	Land Area 1/	Population 2/
	- 1,000 sq. miles -	- Thousands -
Saudi Arabia	(596.9)	4,500 - (7,000)
Yemen	(75.2)	3,500 - (4,500)
Aden Colony	(0.1)	80 - (100)
Aden Protectorates	(112.0)	650 - (800)
Muscat and Oman	(82.0)	500 - (550)
Trucial Oman	(5.8)	95 - (80)
Qatar	(8.4)	30 - (20)
Bahrein Islands	(0.2)	120 - (112)
Kuwait	(8.0)	100 - (150)
Total Arabian Peninsula	(888.6)	8,075 - (13,312)

Note: Bracketed figures from FAO Yearbook of Food and Agricultural Statistics, 1953, Vol. VII, Part 1.

1/ Totals shown for land area of separate countries must be regarded as approximations only; no comprehensive land survey has been made. With the exception of Saudi Arabia's common borders with Iraq and Kuwait, and a hundred-mile section of the northern limits of Yemen, from Najrān to the Red Sea, which have been defined, boundaries between the countries are indefinite.

2/ Since no actual census of population has ever been taken in the Arabian Peninsula, varying estimates by reliable sources can be no more than rough guesses, as shown above. In the case of Saudi Arabia, information obtained by the calculation of a trial food balance for 1950-51 would indicate that the lower figure is more nearly accurate.

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